

## **TRICOLORED BLACKBIRD (*Agelaius tricolor*)**

Edward C. Beedy, Jones & Stokes, 2600 V Street, Sacramento, CA. 95818-1914; tbeedy@jps.net

### **Criteria Scores**

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
20	0	2.5	5	10	7.5	20

### **Special Concern Priority**

Currently considered a Bird Species of Special Concern (year-round), Priority 1. Included on CDFG=s (1992) unprioritized list but not on the original prioritized list (Remsen 1978).

### **Breeding Bird Survey Statistics for California**

Data inadequate for trend assessment (Sauer et al. 2000).

### **General Range and Abundance**

No subspecies are recognized (American Ornithologists=s Union 1957, Pyle 1997). Banding studies (Neff 1942, DeHaven and Neff 1973, DeHaven et al. 1975a) indicate that birds from Santa Barbara County south to Baja California and east to the Sonoran Desert remain within that area and could represent a separate metapopulation.

The tricolored blackbird is largely native to California, where more than 99% of the global population resides; in most years the Central Valley holds more than 90% of all breeding adults (global population was estimated at about 163,000 adults in 2000) (Hamilton 2000). The species also breeds locally along the California coast from Humboldt south to San Diego county, the Modoc Plateau and western edge of the Great Basin (mostly Klamath Basin), lowlands west of the Sierra Nevada, and western portions of San Bernardino, Riverside, and San Diego counties. Small tricolored blackbird nesting colonies have also been found locally in Oregon, Washington, Nevada, and coastal Baja California. During winter, virtually the entire population of the species withdraws

from Washington, Oregon (a few remain) Nevada, and Baja California, and wintering populations shift extensively within their breeding range in California (Beedy and Hamilton 1999).

### **Seasonal Status in California**

Tricolored blackbirds are permanent residents of California, but migrations and movements are extensive by both breeding and wintering populations (DeHaven et al. 1975a, Hamilton 1998).

Breeding extends from mid-March through early August (Beedy and Hamilton 1999); autumnal breeding (September through November) has been documented at several sites in California (Orians 1960, Payne 1969).

### **Historical Range and Abundance in California**

The tricolored blackbird's historical breeding range in California included the Sacramento and San Joaquin valleys, lowlands of the Sierra Nevada south to Kern County, along the coast from Sonoma County south to the Mexican border, and sporadically on the Modoc Plateau (Dawson 1923, Neff 1937, Grinnell and Miller 1944). However, historical surveys did not include large areas of the species' currently known breeding range including the north coast (i.e., north of Sonoma County), southern San Joaquin Valley, and interior deserts that were covered in later surveys (Hamilton et al. 1995, Beedy and Hamilton 1997, Hamilton 2000).

Few nineteenth-century accounts exist of the abundance of tricolored blackbirds in California. Heermann (1859, p.53) described fall flocks of thousands in the Shasta region, and a wintering flock in Solano County, "numbering so many thousands as to darken the sky for some distance by their masses." Belding (1890) observed an "immense" colony in San Joaquin County. According to notes of J. G. Cooper, the tricolored blackbird was "the most abundant species near San Diego and Los Angeles, and not rare at Santa Barbara" (Baird 1870, p.266, Baird et al. 1874, p.166). Grinnell (1898) reported them present in "considerable numbers" throughout the year in Los Angeles County.

Neff (1937) conducted the first systematic surveys of the species' population status and distribution. In 1934, he observed as many as 736,500 adults in just eight Central Valley counties. From 1931 to 1936, he found 252 colonies in 26 California counties. The largest colony, in Glenn County, contained more than 200,000 nests (about 300,000 adults) and covered almost 24 ha; several others in Sacramento and Butte counties contained more than 100,000 nests (about 150,000 adults). Most large colonies were associated with freshwater emergent wetlands in rice-growing areas of the Sacramento Valley.

### **Recent Range and Abundance in California**

Recent surveys indicate the overall range of the species is little changed since the mid-1930s (Beedy and Hamilton 1999). Since 1980, active breeding colonies have been observed in 46 California counties; most of the largest were in the Central Valley. Banding studies (Neff 1942, DeHaven and Neff 1973) and observations of unbanded birds (Payne 1969, Orians 1961) demonstrated that some tricolored blackbirds reside in Central Valley throughout the year. During the breeding season, the species often exhibits itinerant breeding (Hamilton 1998). Individuals usually move north after first nesting efforts (March to April) in the San Joaquin Valley and Sacramento County to new breeding locations in the Sacramento Valley, northeastern California, and rarely Oregon, Nevada, and Washington. Although later nesting is typical in the north, small colonies may form during April to June throughout the species= breeding range.

Recent statewide censuses have shown dramatic declines in tricolored blackbird populations from their former abundance (Beedy and Hamilton 1997, Hamilton et al. 1999, Hamilton 2000). Statewide totals of adults in four late-April surveys covering all recently known colony sites were: 369,359 (1994); 237,928 (1997); 104,786 (1999); and 162,508 (2000). Population declines were most apparent in the Central Valley, especially in Sacramento County (see "Ecological

Requirements” and “Threats,” below). More than half of all observed nesting efforts in the 1990s occurred in a few, large colonies (>5000 nests).

Although resident in California, wintering tricolored blackbird populations move extensively throughout their range. Major wintering concentrations occur in and around the Sacramento-San Joaquin River Delta and coastal areas, including Monterey and Marin counties where they are often associated with dairies. Small flocks may appear at other coastal locations from Sonoma County south to Santa Cruz County, and sporadically north to Del Norte County; wintering birds are rare in the southern San Joaquin and northern Sacramento valleys, especially north of Sacramento County (Beedy and Hamilton 1999).

### **Ecological Requirements**

Tricolored blackbirds are among the most colonial of North American passerine birds. As many as 20,000 to 30,000 nests have been recorded in cattail marshes of 4 ha or less (Neff 1937, DeHaven et al. 1975b). Individual nests may be < 0.5 m from each other, and nest heights range from a few centimeters to about 1.5 m above water or ground at freshwater marsh colony sites (Neff 1937). Nests can be up to 3-m high in the canopies of willows (*Salix* sp.) and other riparian trees; rarely, they are built on the ground. The species has three basic requirements for selecting breeding sites: open accessible water; a protected nesting substrate, including either flooded or thorny or spiny vegetation; and, a suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony (Beedy and Hamilton 1999).

The colonial breeding system of the tricolored blackbird probably evolved in the Central Valley where the locations of surface waters and rich sources of insect food were ephemeral and varied annually (Orians 1961). Before its rivers were dammed and channelized, the Central Valley flooded in many years, forming a vast mosaic of seasonal wetlands, freshwater marshes, alkali flats, native grasslands, riparian forests, and oak savannas. Virtually all these habitats once supported

nesting and foraging tricolored blackbirds. The evolution of a colonial breeding system enabled this species to rapidly assess changing local conditions, and to exploit outbreaks of locusts and other ephemeral insects over large areas to meet their food demands. Nomadic, colonial social organization in birds evolves most frequently in semi-arid areas with great annual fluctuations in climate (Orians 1961).

Historically most colonies were in freshwater marshes dominated by tules (*Schoenoplectus* sp.) and cattails (*Typha* sp.), but some were in nettles (*Urtica* sp.), thistles (*Cirsium* sp.), and willows (*Salix* sp.) (Neff 1937). However, the use of freshwater marshes as breeding colony sites decreased from 93% ( $n=252$  colonies) in the 1930s (Neff 1937) to 54% in the 1970s ( $n=158$  colonies) (DeHaven et al. 1975b). An increasing percentage of colonies since the 1970s were reported in Himalayan blackberries (*Rubus discolor*) and thistles (DeHaven et al. 1975b, Cook 1996) and some of the largest recent colonies were in silage and grain fields (Hamilton et al. 1995). Other less commonly used nesting substrates include safflower (*Carthamus tinctorius*), saltcedar (*Tamarix* sp.), elderberry/poison-oak (*Sambucus* sp. and *Toxicodendron diversilobum*), giant cane (*Arundo donax*), and riparian scrublands and forests (e.g., *Salix* sp., *Populus* sp., *Fraxinus* sp.) (Beedy and Hamilton 1999).

Wintering tricolored blackbirds often congregate in huge, mixed-species blackbird roosts that forage together in grasslands and agricultural fields with low-growing vegetation, and at dairies and feedlots. In February, however, this species segregates into pure tricolored blackbird flocks, which may subdivide further into age and sex-specific flocks. At this time, foraging flocks roam across the landscape until they find a suitable nesting substrate with an abundant insect source nearby. Among the most important insects for adults provisioning nestlings include Coleopterans, Orthopterans, Hemipterans, other larval insects, and Arachnidians (Crane and DeHaven 1977).

With the loss of a natural flooding cycle and most native wetland and upland habitats in the Central Valley, tricolored blackbirds now forage primarily in artificial habitats. Ideal foraging

conditions for this species are created when shallow flood-irrigation, mowing, or grazing keeps the vegetation at an optimal height (< 15 cm). Preferred foraging crops include rice, alfalfa, irrigated pastures, ripening or cut grain fields (e.g., oats wheat, silage), annual grasslands, cattle feedlots and dairies (Beedy and Hamilton 1999). They also forage in remnant native habitats including wet and dry vernal pools and other seasonal wetlands, riparian scrub habitats, and open marsh borders. Vineyards, orchards, and row crops (tomatoes, sugar beets, corn, peas, beets, onions, etc.) do not provide suitable nesting substrates or foraging habitats for tricolored blackbirds.

Most tricolored blackbirds forage within 5 km of their colony sites (rarely up to 13 km) (Orians 1961, Beedy and Hamilton 1997). Proximity to suitable foraging habitat appears to be extremely important for the establishment of colony sites, as tricolored blackbirds usually forage, at least initially, in the field containing the colony site (Cook 1996). However, often only a minor fraction of the area within the commuting range of a colony provides suitable foraging habitat (Beedy and Hamilton 1999).

## **Threats**

The greatest threats to this species are the direct loss and degradation of habitat due to human activities (Beedy and Hamilton 1999). Most native habitats that once supported nesting and foraging tricolored blackbirds in the Central Valley have been replaced by urbanization and unsuitable agricultural uses including vineyards, orchards, and row crops. In Sacramento County, an historic breeding center of this species, the conversion of grassland and pastures to vineyards expanded from 3050 ha in 1996 to 5330 ha in 1998 (DeHaven 2000). Conversions of pastures and grasslands to vineyards in Sacramento County have resulted in the recent loss of several large colonies, and the elimination of extensive areas of suitable foraging habitat for this species (Cook 1996).

Entire colonies (up to tens of thousands of nests) in cereal crops and silage are often destroyed by harvesting and plowing of agricultural lands (Beedy and Hamilton 1999).

Concentration of a high proportion of the known population in a few breeding colonies increases the risk of major reproductive failures, especially in vulnerable habitats such as active agricultural fields.

Historical accounts documented the destruction of nesting colonies by a diversity of avian, mammalian, and reptilian predators (Beedy and Hamilton 1999). Recently, especially in permanent freshwater marshes of the Central Valley, entire colonies have been lost to black-crowned night-herons (*Nycticorax nycticorax*) and common ravens (*Corvus corax*). Some large colonies (up to 100,000 adults) may lose (>50%) of nests to coyotes (*Canis latrans*), especially in silage fields, but also in freshwater marshes when water is withdrawn (Hamilton et al. 1995).

Various poisons and contaminants have caused mass mortality of tricolored blackbirds. McCabe (1932) described the strychnine poisoning of 30,000 breeding adults as part of an agricultural experiment. Neff (1942) considered poisoning to regulate numbers of blackbirds preying upon crops (especially rice) to be a major source of mortality. This practice continued until the 1960s, and thousands of tricolored blackbirds and other blackbirds were exterminated to control damage to rice crops in the Central Valley.

Beedy and Hayworth (1992) observed a complete nesting failure of a large colony (about 47,000 breeding adults) at Kesterson Reservoir, Merced County, and selenium toxicosis was diagnosed as the primary cause of death. At a Kern County colony, all eggs sprayed by mosquito abatement oil failed to hatch (Beedy and Hamilton 1999). Hosea (1986) attributed the loss of at least two colonies to aerial herbicide applications.

### **Management and Research Recommendations**

The maintenance of a viable, self sustaining population distributed throughout the current range of the species will require coordinated mix of management, monitoring, and research activities implemented on both public and private lands. Because the species' population is distributed in

various habitats and land ownerships, public and private partnerships to fund and implement these activities will be crucial.

- Incorporate population and habitat conservation actions for tricolored blackbird in Habitat Conservation Plans, Natural Communities Conservation Plans, and other multi-species conservation plans and in ongoing private land agricultural and conservation easement programs.
- Through habitat restoration, promote the growth of secure nesting substrates (e.g., nettles, thistles, and other naturally-armored, native plants) near productive foraging habitats to increase the potential carrying capacity for this species. Restored nesting habitats should be situated on protected public and private lands, especially in agricultural areas of the Central Valley and surrounding foothills.
- When possible, lure nesting tricolored blackbirds away from dairies and other agricultural operations to secure habitats where they are more likely to succeed; if occupied by colonies, defer harvest of occupied grain and silage crops until after the breeding season.
- Investigate predator-prey relationships, especially the ongoing effects of black-crowned night-herons and coyotes and the responses of individuals and colonies to predators.
- Perform demographic research to determine if reproductive success of freshwater marsh colonies varies with respect to wetland size and spatial relationships with other wetlands.
- Use genetic studies to determine the taxonomic status of the southern California breeding population.
- Analyze depletion of food resources by blackbirds near breeding colonies and quantify the extent and character of foraging habitats near colonies.
- Evaluate habitat selection mechanisms and the relative value of alternative foraging habitats to breeding birds.



- Use radiotelemetry to measure adult and juvenile dispersal from several colonies.
- Evaluate the distribution, resource utilization, and survival of wintering birds.

### **Monitoring Needs**

The Breeding Bird Survey is inadequate for monitoring changes in the population size and distribution of the tricolored blackbird (Sauer et al. 2000). The ongoing Volunteer Surveys, initiated in 1994 and sponsored by California Department of Fish and Game and U. S. Fish and Wildlife Service, have been useful for documenting long-term population trends of this species. The primary objectives of a tricolored blackbird monitoring program are to: track annual distribution and population trends; documenting the presence (or absence), location, and size of tricolor breeding colonies throughout the historic range; and, to monitor reproductive success to assess population viability and determine habitat characteristics associated with nesting success.

The Volunteer Survey should be conducted at least once every three years. Participants should visit previously documented colony locations, explore other potentially suitable nesting habitats, and gather data on specific colony location, acreage, vegetative substrate, breeding behavior, and total number of adults (estimated from about 25 m from the nesting area). Repeat visits later in the breeding season are recommended to determine the fate of active colonies; entry into active colonies is discouraged. The surveys will be especially valuable if conducted over a period of years, using consistent methods and an increasing core of experienced observers, thereby documenting new breeding localities and lost habitats, increasing observer skills in species and habitat identification, and enhancing public awareness of this unique species.

### **Literature Cited**

- American Ornithologist=s Union. 1957. Check-list of North American birds. 5th ed. Am. Ornithol. Union, Washington, DC.
- Baird, S. F., ed. 1870. Ornithology of California. Land birds, Vol. I. From the manuscript and notes of J. G. Cooper. U.S. Geologic Survey of California. Welch Bigelow and Co. Cambridge, MA.

- Baird, S. F., T. M. Brewer, and R. Ridgway. 1874. A History of North American Birds. Land birds. Vol. II. Little, Brown, and Co., Boston.
- Beedy, E. C. and W. J. Hamilton III. 1999. Tricolored Blackbird (*Agelaius tricolor*). In The Birds of North America, No. 423 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia. (Note: this is the preferred BNA citation—did not change).
- Beedy, E. C., and W. J. Hamilton III. 1997. Tricolored Blackbird status update and management guidelines. (Jones & Stokes Associates, Inc. 97B099). Prepared for U.S. Fish & Wildl. Serv., Portland, and Calif. Dept. of Fish & Game, Sacramento.
- Beedy, E. C., and A. Hayworth. 1992. Tricolored Blackbird nesting failures in the Central Valley of California: general trends or isolated phenomena?, in Endangered and sensitive species of the San Joaquin Valley, California (D. F. Williams, S. Byrne, and T. A. Rado, eds.), pp. 33B46. Calif. Energy Comm., Sacramento.
- Belding, L. 1890. Land birds of the Pacific district. Occas. Pap. Calif. Acad. Sci. II.
- California Department of Fish and Game. 1992. Unprioritized list of bird species of special concern in California. The Resources Agency, California Department of Fish and Game, Wildl. Manage. Division, Nongame Bird and Mammal Section.
- Cook, L. 1996. Nesting adaptations of Tricolored Blackbirds (*Agelaius tricolor*). Master's thesis, Univ. of Calif., Davis.
- Dawson, W. L. 1923. The Birds of California. South Moulton Co., San Francisco.
- DeHaven, R. W. 2000. Breeding Tricolored Blackbirds in the Central Valley, California: A Quarter-Century Perspective. Unpublished report prepared for U.S. Fish & Wildl. Serv., Sacramento.
- DeHaven, R. W., and J. A. Neff. 1973. Recoveries and returns of Tricolored Blackbirds, 1941-1964. West. Bird Bander 48:10B11.
- DeHaven, R. W., F. T. Crase, and P. P. Woronecki. 1975a. Movements of Tricolored Blackbirds banded in the Central Valley of California, 1965-1972. Bird-Banding 46:220B229.
- DeHaven, R. W., F. T. Crase, and P. P. Woronecki. 1975b. Breeding status of the Tricolored Blackbird, 1969-1972. Calif. Fish Game 61:166B180.
- Grinnell, J. 1898. Birds of the Pacific slope of Los Angeles County. Pasadena Acad. Sci. Publ. 11.
- Grinnell, J., and A. H. Miller. 1944. The distribution of the birds of California. Pac. Coast Avifauna 27.
- Hamilton, W. J., III. 2000. Tricolored blackbird 2000 breeding season census and survey observations and recommendations. Available from: Division of Environmental Studies, University of Calif. Davis (wjhhamilton@ucdavis.edu).

- Hamilton, W. J., III. 1998. Tricolored Blackbird itinerant breeding in California. *Condor* 100:218B226.
- Hamilton, W.J., III., L. Cook, and K. Hunting. 1999. Tricolored blackbird 1999 status report. Available from: Division of Environmental Studies, University of Calif. Davis (wjhamilton@ucdavis.edu).
- Hamilton, W. J., III, L. Cook, and R. Grey. 1995. Tricolored Blackbird project 1994. Unpubl. report prepared for U.S. Fish & Wildl. Serv., Portland.
- Hosea, R. C. 1986. A population census of the Tricolored Blackbird, *Agelaius tricolor* (Audubon), in four counties in the northern Central Valley of California. Master=s thesis, Calif. State Univ., Sacramento.
- McCabe, T. T. 1932. Wholesale poison for the Red-wings. *Condor* 34:49B50.
- Neff, J. A. 1937. Nesting distribution of the Tri-colored Red-wing. *Condor* 39:61B81.
- Neff, J. A. 1942. Migration of the Tricolored Red-wing in central California. *Condor* 44:45B53.
- Orians, G. H. 1960. Autumnal breeding in the Tricolored Blackbird. *Auk*. 77:379B398.
- Orians, G. H. 1961. The ecology of blackbird (*Agelaius*) social systems. *Ecol. Monogr.* 31:285B312.
- Payne, R. 1969. Breeding seasons and reproductive physiology of Tricolored Blackbirds and Redwinged Blackbirds. *Univ. Calif. Publ. Zool.* 90:1B137.
- Pyle, P. 1997. Identification guide to North American birds, Part I. Slate Creek Press, Bolinas, CA.
- Remsen, J. V., Jr. 1978. Bird species of special concern in California. Project PR W-54-R-9, Nongame wildlife investigations, Wildlife Management Branch Administrative Report No. 78-1.
- Sauer, J. R., Hines, J. E., Thomas, I., Fallon, J., and Gough, G. 2000. The North American Breeding Bird Survey, results and analysis 1966-1999. Version 98.1, USGS Patuxent Wildl. Res. Ctr., Laurel MD (<http://www.mbr-pwrc.usgs.gov/bbs/bbs.html>).